

Missouri Department of Natural Resources

Total Maximum Daily Load Information Sheet

Dry Auglaize Creek

Water Body Segment at a Glance:

County: Laclede
Nearby Cities: Lebanon
Length of impairment: 1.5 miles
Pollutant: Unknown
Source: Lebanon Wastewater Treatment Plant
Water Body ID (WBID): 1145

TMDL Priority Ranking: EPA approved a Permit-in-Lieu of a TMDL on March 12, 2008.



Description of the Problem

Designed beneficial uses of Dry Auglaize Creek

- Livestock and Wildlife Watering
- Protection of Aquatic Life (Warm-water Fishery)
- Human Health Protections (Fish Consumption)
- Whole Body Contact Recreation

Use that is impaired

- Protection of Aquatic Life (Warm-water Fishery)

Standards that apply

Although listed for “unknown pollutant” on the 2002 303(d) List, the Department of Natural Resources (department) believes the following standards apply:

- The Missouri Water Quality Standard (WQS), found in 10 CSR 20-7.031 Table A, for dissolved oxygen (related to BOD) in streams is 5.0 mg/L (milligrams per liter, or parts per million).
- The standards for non-filterable residue (NFR) are covered under the general criteria section of the WQS at 10 CSR 20-7.031(3)(A) and (C), which read respectively as follows:
 - Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses.
 - Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses.

Since the standard that applies to NFR is a narrative, rather than a numeric standard, an interpretation is needed to link it to a numeric criterion that can be used to determine when water quality standards are met. In this case, volatile suspended solids (VSS), a measure of the organic solids coming from WWTPs, is a good “translator” to represent NFR.

Background Information and Water Quality Information

The original pollutants listed on the 1998 303(d) List for Dry Auglaize Creek were Biochemical Oxygen Demand (BOD) and Non-Filterable Residue (NFR). It was listed for “unknown pollutant” on the 2002 List. The department believes the original designation of pollutants was correct.

Volatile suspended solids refer to both particles that are suspended in water, like planktonic algae (tiny, floating plants that contribute to water’s green color), and particles that settle out, like sewage sludge. When the organic component of sludge decomposes, it uses oxygen, lowering dissolved oxygen (DO) levels in the stream. Algae also impact DO levels. During daylight hours algae produce oxygen through photosynthesis. However, plants, like animals, also “respire” 24 hours per day, using oxygen and producing carbon dioxide. Under normal conditions, DO levels rise during the day as photosynthesis produces more oxygen than is used by the combination of decomposition and plant and animal respiration. During the night, when no photosynthesis occurs, dissolved oxygen levels naturally drop and reach its lowest point just before dawn. Excessively large amounts of algae create problems with water color and turbidity, and, most troubling, cause extreme high and low swings in DO levels.

BOD is the oxygen needed to support microbes that will break down organic matter. Untreated wastewater is high in BOD. High BOD reduces the amount of oxygen available for naturally occurring aquatic organisms, many of which require high levels of oxygen to survive. Additional lowering of DO occurs when large amounts of algae die and decompose.

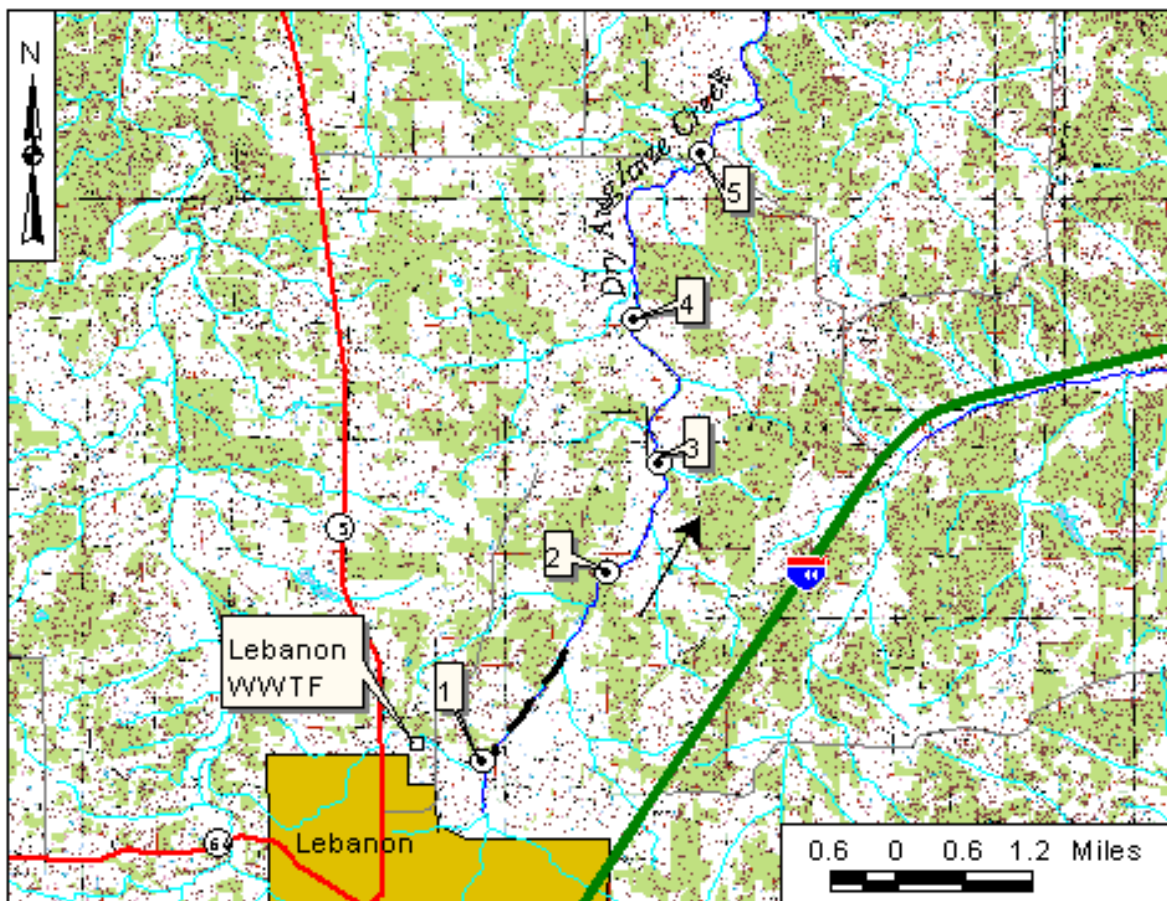
The factors listed above illustrate why high BOD and VSS, especially in combination, can cause dissolved oxygen levels in the stream to drop dramatically, negatively impacting aquatic life. As mentioned earlier, the Water Quality Standards require a minimum of 5 mg/L of DO in streams to ensure that aquatic life can be sustained.

The department believes that the source of the problem is not the Lebanon Wastewater Treatment Plant (WWTP) itself, but rather a documented history of sanitary sewer overflows, where wastewater in the sewer pipes overflows out of manholes before it gets to the WWTP for treatment. This phenomena, which results in untreated wastewater getting released into Dry Auglaize Creek, is called “*bypassing*.” Bypassing is long documented at manhole #1, located 100 yards upstream (south) of the Lebanon plant.

Although water quality data collected by both the WWTP and the department in 1999 and 2000 showed that water quality standards were met for BOD and DO, there were high amounts of algae downstream of the WWTP. In addition, biological assessment data collected by the department downstream from the WWTP in March and September, 2000 showed there was a reduction in the diversity of aquatic macroinvertebrates (like water insects and crayfish). The impairment noted during the late September sampling was most likely a result of untreated wastewater entering the stream during the bypass discharges documented from manhole #1 earlier that month.

The Lebanon WWTP discharges to a “losing stream” section of Dry Auglaize Creek. A losing stream is one that loses 30 percent or more of its flow to the groundwater system within two miles’ distance. Normal gaining streams increase in flow as they move downstream. Most of the water in Dry Auglaize Creek is discharged from the wastewater treatment plant. Dry Auglaize “loses” most of the flow the treatment plant provides as it moves downstream. A map identifying the department’s five sampling sites located in the seven miles below the WWTP outfall is provided in Figure 1. Note that the impaired segment is the first mile and a half below the WWTP’s outfall.

Figure 1. Dry Auglaize Creek in Laclede County, Missouri, showing impaired segment and sampling sites.



--- Impaired Segment → Direction of Flow

Site Index	
1	Lebanon WWTP Outfall
2	Dry Auglaize Creek 2 miles below Lebanon WWTP
3	Dry Auglaize Creek 3.2 miles below Lebanon WWTP
4	Dry Auglaize Creek 5 miles below Lebanon WWTP
5	Dry Auglaize Creek 7 miles below Lebanon WWTP

The city's state operating permit, MO-0089010, issued September 29, 2006, has enforceable limits that address the WWTP discharge. The city's required Whole Effluent Toxicity (WET) tests and in-stream monitoring on Dry Auglaize Creek are described in the permit. In addition, a reopener clause was included to allow for stricter limits if future monitoring shows violations of Missouri's Water Quality Standards.

The City of Lebanon is party to a consent decree (CD), signed in late 2003 and early 2004, with the Environmental Protection Agency (EPA) and the State of Missouri (Civil Action No. 04-3125-CV-S-RED). The CD requires elimination of bypassing from the city's sewage collection system and construction of adequate system capacity by July 1, 2007. Elimination of bypassing should allow for wastewater to be treated at the WWTP before it is released to Dry Auglaize Creek. Construction of corrective measures is currently underway. Once complete, water quality should improve for aquatic life in Dry Auglaize Creek. The department plans to conduct biological and water quality monitoring as deemed appropriate subsequent to completion of construction.

In summary, in lieu of a Total Maximum Daily Load (TMDL), the department opted to correct the impairments in Dry Auglaize Creek through permit limits and a schedule for completion of system upgrades and improvements. A request for concurrence on using the September 29, 2006 permit, in combination with the CD, in lieu of a TMDL was sent to EPA's Region VII in a letter dated October 27, 2006 and approved on March 12, 2008. A construction permit was issued in May 2009. As of early 2010, a lift station was constructed at Goodwin Hollow and upgrades to the treatment plant (e.g., adding a fourth clarifier, enabling disinfection, and construction of a third oxidation ditch) were pending.

For more information call or write:

Missouri Department of Natural Resources
Water Protection Program

P.O. Box 176, Jefferson City, MO 65102-0176
1-800-361-4827 or (573) 751-1300 office

(573) 522-9920 fax

Program Home Page: <http://www.dnr.mo.gov/env/wpp/index.html>

(The department's TMDL Fact Sheet entitled, "What are TMDLs?," defines TMDLs in general terms and can be found at: <http://www.dnr.mo.gov/pubs/pub2090.pdf>)